



Unlocking Learning

The implementation and effectiveness of digital learning
for Syrian refugees in Lebanon

Thomas Dreesen, Akito Kamei, Despina Karamperidou, Sara Abou Fagher,
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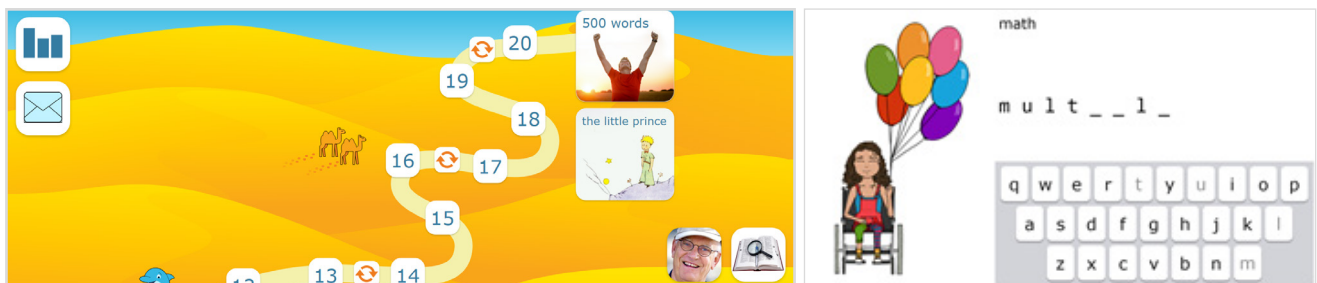
Executive summary

The COVID-19 pandemic resulted in school closures around the world, at its peak affecting 1.6 billion students worldwide (UNESCO, 2020). This crisis has underscored the importance of resilient education systems that can support all, especially the most marginalized, to learn during times of crisis. Even before the COVID-19 pandemic, nearly one in four children globally were living in countries affected by conflict or disaster, unable to routinely access quality education (UNICEF, 2016). The growing use of digital technologies in education (commonly referred to as EdTech) during COVID-19 school closures has heightened the need to understand how to best use EdTech in humanitarian and crisis contexts.

This report presents findings from the UNICEF-Akelius Foundation Innovation in Education Partnership and its implementation of a digital course used on tablets and mobile phones for language learning in Lebanon, where 40 per cent of school-age children and adolescents are Syrian refugees. The digital course was introduced in non-formal education (NFE) classes for Syrian refugees to strengthen English or French language learning and help their transition to Lebanon's trilingual education system, where classes are taught in Arabic, French and English.

The goal of the digital course examined in this research is to provide students and teachers with a tool to accelerate language learning for marginalized children. The digital course is free, includes no advertising and requires no prior user information to access. It can be accessed online via a web browser, or online and offline (when content is downloaded) through a mobile application on tablets or mobile phones. The content and features of the course are developed through a co-creation approach with frequent communication and feedback from implementing teachers based on the real-world use of the course with students (see Image 1).

Image 1. Examples of the Akelius Digital Language Course content



When first implemented in Lebanon in 2019, the course was used in three centres serving 246 students as a teaching tool within traditional face-to-face classrooms. In class, students used the course on individual tablets with headphones and were guided by teachers who were present. However, when schools and education centres in Lebanon closed in March 2020, the course was implemented in a fully remote learning environment and expanded across the country to 64 NFE centres covering a total of 7,237 refugee students.

As a result, this report presents analysis on the implementation of the digital course in three key areas: First, the report investigates the digital course's use in a blended learning environment where it was used on tablets by students as part of traditional face-to-face classroom instruction with teachers. Second, the analysis examines the transition to remote learning where the course was used on devices owned by the household, supported by teachers remotely. Third, the report estimates the effectiveness of the use of the digital course during this period of remote learning from August–November 2020.

Summary of key findings:

1. When used during in-person classes, qualitative evidence from teachers indicates that the course led to improvements in their classroom environment, students' confidence, motivation to go to class and speaking skills.
2. The successful transition to remote digital learning relied on frequent, clear communication between educators and households and ongoing support from educators to overcome challenges, including unreliable internet connectivity and distrust of technology within the community.
3. In both face-to-face and remote settings, teachers remained the key to successful implementation of digital learning. When centres closed, teachers gave additional support to students and families beyond their already challenging role of teaching from a distance. They provided psychosocial support to families, as well as technological support by developing and delivering guides on how to use technology, providing data package top-ups and even helping to install internet routers within communities.
4. When implemented in a fully remote learning environment, students from classes that introduced the digital course showed statistically significant improvements in foreign language (French or English, 21.2 per cent increase; Arabic, 21.1 per cent increase), and art (11.1 per cent increase) competencies compared to students from centres that didn't use the digital course. These findings are robust when controlling for baseline learning levels of students, demographic characteristics and the location of the learning centre.



Recommendations for policymakers, education practitioners, and EdTech developers

Education systems and practitioners were unprepared for the unprecedented school closures due to the COVID-19 pandemic and rapidly adapted to provide learning for children. Governments need to build resilience in education systems and, as part of that process, have a systems approach to providing equitable digital learning whether the classroom is physical or virtual. The following are recommendations from the experience of the UNICEF-Akeli Foundation partnership in Lebanon:

- **Governments should prioritize investments in reliable electricity and connectivity infrastructure, especially for hard-to-reach and marginalized areas and populations.** Work must be done at the same time with the private sector to ensure low-cost and affordable data, all of which are needed to enable equitable digital learning. Education partners across Lebanon cited connectivity as the major barrier faced when providing digital remote learning, compounded by the high cost of data.
- **Frequent communication with families and communities should continue beyond remote learning to sustain increased caregiver engagement in their children's learning.** Education coordinators noted that caregivers were more engaged in their children's learning while using the digital course at home. For refugee families with low trust of institutions, the trust and relationships built with community-based NFE actors continues to be critical to encourage families to pursue education for their children.
- **Education providers must invest in the digital skills of teachers and facilitators and their readiness for digital learning, whether in the remote or physical classroom.** Implementation of digital learning during school closures varied between centres, partners, and teachers. Many times those differences were based on the capacities of teachers and various technological constraints in communities. Investments in the digital skills of teachers and facilitators need to be met with ongoing support and guidance for them on how to effectively integrate technology into their teaching practice.
- **The support system needed to enable digital learning must be invested in, and the key role of teachers in successful implementation of EdTech must be acknowledged and supported.** Teachers provided extra-academic support to families in alleviating technology and connectivity issues throughout school closures. The use of technology for learning requires much more than a device held by a student and an engaged teacher. Governments and education providers should cost and invest in the entire support system for digital learning, including in human resources to alleviate technological and connectivity challenges, monitoring and evaluation systems, and implementation research to understand how digital learning works. Doing so would reduce the burden that falls on individual teachers or organizations to provide technology support on top of their regular teaching duties.
- **Software developers should design programs and prioritize application features that align with the needs of teachers and to the constraints of the learning environment.** While interactive and engaging content should be a priority, it must be coupled with EdTech solutions designed to be used in low- or no-connectivity settings.

1. Introduction

The use of EdTech in education has been long advocated for its potential to improve student outcomes through several pathways. Software can be designed to encourage and support self-paced learning that is typically difficult to achieve in group instruction, especially large classes ([Koedinger et al., 1997](#); [Roschelle et al., 2000](#); [Rodriguez-Segura, 2021](#)). Computer Assisted Learning (CAL) programs can enable adaptive learning where education content delivered on the screen is individualized based on the strengths and weaknesses of the student ([Muralidharan et al., 2019](#)). While EdTech programmes may have a wide variety of goals, such as improving literacy and numeracy, or language skills, the use of EdTech can also help build students' digital skills, which is increasingly important as economies transform and become more digital ([Flack et al., 2020](#)).

However, while the potential is great for EdTech to support good practices in education and pedagogy, such as teaching at the right level, the evidence on effective use of technologies to improve children's outcomes is mixed. What has become clear is that the introduction of technology has had large and positive effects for students and teachers when introduced into a clear teaching framework ([Brossard et al., 2021](#); [Bulman and Fairlie, 2016](#)). In short, while the choice of the technological tool or software is important, how it is effectively used by teachers and students to achieve learning outcomes is even more critical.

In the context of education in emergencies, the use of mobile technologies can also enable access to learning opportunities when education systems are disrupted ([Tauson and Stannard, 2018](#); [De Hoop et al., 2019](#)). In 2020, the COVID-19 pandemic and related school closures accelerated the take-up and use of mobile technologies to support children's learning. These education institutions' closures have also highlighted the considerable inequities of children's access to the technologies needed for remote learning, and the lack of preparedness of education systems across the globe to effectively use technology for learning ([UNICEF, 2020](#); [UNICEF 2021](#)). So, while EdTech solutions have the potential to address education challenges in low-resource and conflict settings, where class sizes may remain large and learning levels remain low, ([UNICEF, 2019](#); [Save the Children, 2019](#)) these contexts are also the least likely to have the human resources and infrastructure needed to use EdTech effectively and at scale ([Dreesen et al., 2020](#)).

This report aims to add to the growing evidence base on the use of EdTech in low-resource settings. In particular, the report presents findings on two until now relatively sparsely researched topics: The use and effectiveness of EdTech in a protracted humanitarian context (for Syrian refugees in Lebanon) and the transition to, and effectiveness of, EdTech for remote learning during COVID-19. More specifically, this research focuses on the implementation of the Akelius Digital Language Learning Course (subsequently referred to as the digital course) in NFE classes in Lebanon that serve Syrian refugee children.

Box 1. The UNICEF-Akelius Foundation Innovation in Education Partnership

In 2017, UNICEF Headquarters, UNICEF Sweden and the Akelius Foundation engaged in a partnership to support UNICEF Education in Emergencies (EiE) programmes.

The partnership embarked on the co-creation of the digital course with local implementing educators starting in Greece in 2017 and subsequently expanding to Lebanon, Mauritania, Bosnia and Herzegovina, Serbia and Italy. The digital course, used on tablets, mobile phones or computers, is a tool to support language learning among refugees, migrants, and linguistic minorities around the world. The partnership aims to help children learn languages to facilitate their inclusion into schools in host communities and societies more broadly.

Within the partnership there is a strong emphasis on evidence generation to track progress, learn, inform, and improve implementation. In each context, resources are invested to understand how implementation of the digital learning course works towards improving learning for children and adolescents. This research is part of a series of reports examining the use of the digital course for children's learning – the first report explored the co-creation, use and effectiveness the digital course in Greece (Karamperidou et al., 2020).

1.1 Education for Syrian refugees in Lebanon

Driven by the influx of Syrian refugees into the country, the population of Lebanon rose from 5.2 million in 2011 to 6.9 million in 2019 ([World Bank, 2021](#)). An estimated 1.5 million Syrian refugees are present in Lebanon ([UNHCR, 2020](#)). This increase in population has put great strain on the Lebanese education system, as 40 per cent of school-age children and adolescents in Lebanon are Syrian refugees ([UNICEF, 2021](#)). To respond to this crisis, the Ministry of Education and Higher Education (MEHE) has undertaken multiple initiatives to provide Syrian refugee children and adolescents access to education. These efforts include waiving primary school fees and offering a second afternoon shift in public primary schools to increase education access for Syrian children ([de Hoop et al., 2018](#)). However, even with these policies implemented, more than half (57 per cent) of Syrian refugees remain out of education in Lebanon ([Human Rights Watch, 2021](#)).

Refugee children in Lebanon face numerous challenges to access education and achieve quality learning. As 58 per cent of Syrian refugee households live in extreme poverty the opportunity cost of attending school can be very high ([El-Ghali et al., 2019](#)). Distance to schools, and the complex transportation system to bring children to schools, discourages enrolment and attendance, especially for girls ([Human Rights Watch, 2016](#)). In many cases there is a lack of awareness and knowledge of education opportunities and the necessary procedures to enrol children into schooling. Administrative barriers to enter into school remain, from specific documentation such as proof of residency that families need, to stringent and short school registration timeframes (*ibid*)¹. In many cases, Syrian refugee children have faced long periods of education disruption and suffered significant learning loss, making it challenging for them to return into schooling. Once in school, Syrian children are also more likely than their Lebanese peers to experience violence, bullying and harassment ([El-Ghali et al., 2016](#)).

A significant barrier to Syrian children accessing and succeeding in schools is Lebanon's trilingual education system. While Arabic is the main language of instruction from early years, English or French (the choice of which depends on location) is taught in classes from primary school and used as the language of instruction for maths/science classes ([Jalbout, 2015](#)). This system puts Syrian refugee students who come from a single language system without a strong understanding of English or French at an extreme disadvantage, especially in the transition to secondary schooling.

1.2 Non-formal education as a bridge to formal learning

To provide a pathway to bring out-of-school children into formal education system, the MEHE has developed the Reaching all Children with Education (RACE) five-year plans (RACE I 2012–2017 and RACE II 2017–2021) ([Crul et al., 2019](#)). These plans rely on local and international non-governmental organizations (NGO) partners to implement non-formal education programmes for Syrian refugee children and adolescents that are regulated by the MEHE. Non-formal education programmes run by NGO partners across the whole Lebanese territory work in a coordinated fashion to support children's learning close to their communities ([Shuayb et al., 2014](#)). Each programme is tailored to respond to the specific needs of students at different age groups and learning levels:

- **Community-Based Early Childhood Education (CB-ECE).** Young children starting from age 3 to age 6 are provided with structured play and learning opportunities focused around six domains of child development – Arabic language, maths, science, social-emotional, physical/psychomotor and artistic lessons, psychosocial support, and introduction to foreign languages (either French or English) to ensure they are ready to transition to primary school.
- **Basic Literacy and Numeracy (BLN) and Youth BLN.** Children and adolescents aged 10–14 years with no, or very limited, education experience are provided the foundational skills needed for the transition into formal schooling. BLN graduates' transition either into the Accelerated Learning Programme or directly into formal education depending on their level and age (see below). The Youth BLN programme supports older adolescents and young people aged 15–20 years with little, or no, education experience, and follows a curriculum adapted to this age group that includes life skills and competency-based learning to support employability.

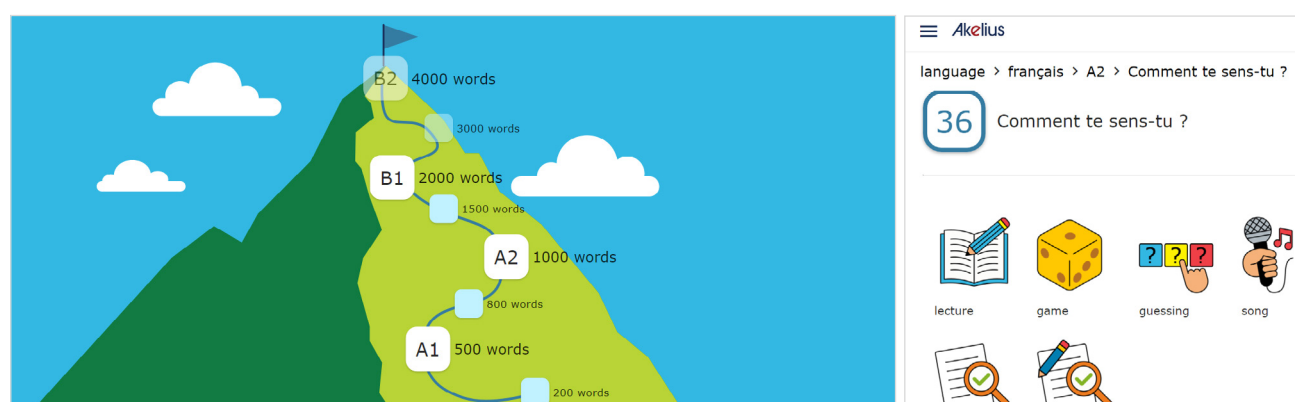
¹ Although the school year in Lebanon starts in early August and ends during late May of the next year, school registration closes in February with no more children admitted afterwards.

- **Accelerated Learning Programme (ALP).** This provides primary school equivalence using an accelerated curriculum for Grades 1–9 and is a direct bridge for children and adolescents into formal schooling. Children who have missed two years of schooling or more, including those who completed the BLN, are able to join the programme from the age of 7.
- **Technical-Vocational Education and Training (TVET).** Vocational training programmes conducted by NGO partners are available for adolescents aged 15 or older to prepare them for employment.

1.3 The introduction of the digital course in NFE classrooms

In 2019, three NFE partners supported by UNICEF Lebanon, the Ana Aqra Association, Mouvement Social, and the Lebanese Organization for Studies and Training (LOST), began testing the use of the digital course for foreign language teaching (either English or French) in their classes. The course was introduced in a CB-ECE centre in Beirut, run by Ana Aqra, and two centres providing BLN classes, run by Mouvement Social in Mount Lebanon and LOST in the Bekaa Valley, respectively. The choice of either the English or French version of the course was determined by the NFE partner based on the language of instruction of the public schools in their respective communities. For the centres in Beirut and Mount Lebanon the English version was used, while in the centre in the Bekaa valley the French version was used.

Image 2. Digital course content



In 2019, the digital course was introduced to classes in a blended teaching and learning approach. This meant that the digital course was used as a teaching tool within a traditional face-to-face classroom implementation. Feedback from teachers in Lebanon indicates that there were three general steps teachers took when introducing the digital course into their classrooms. First, teachers explored the functionality of the digital course and its content, identifying how it could be used in their classes and began to plan how to integrate the tool into their lesson plans. Second, teachers began to introduce the digital course slowly to students in class, initially as a fun activity or as a reward. Third, teachers undertook more systematic integration of the course into their regular teaching practice and lesson plans, to reinforce and supplement learning done through traditional methods (this is consistent with findings on the introduction of the digital course from Greece ([Karamperidou et al., 2020](#))). The content and features of the English and French versions of the digital course were developed iteratively using a co-creation approach, where teachers and UNICEF education staff provided regular feedback to the software development team based on their use of the course in classes with students².

2 This co-creation approach is explored in more detail in [Karamperidou et al., 2020](#).

In March 2020, due to the COVID-19 pandemic, all face-to-face classes were suspended in Lebanon and NFE partners transitioned to remote learning. During this transition, the use of the digital course expanded from three learning centres to more than 60 centres as it was used by NFE partners as a tool for remote learning. The remainder of this report explores findings related to three key time periods:

1. The implementation of the digital course in a blended teaching and learning approach prior to education centre closures and its perceived effects on learning in classrooms (June 2019–Feb 2020);
2. The transition to remote digital learning for NFE partners in Lebanon (March 2020–August 2020); and
3. The effectiveness of digital remote learning during COVID-19 on students' learning (August 2020–November 2020).



2. Methods and research objectives

This report relies on a combination of quantitative and qualitative methods to understand the process of implementation and effectiveness of digital learning for Syrian refugees in Lebanon. Quantitative data is used to understand the transition to remote learning and the associations between various factors including the use of the digital course and children's learning outcomes. Qualitative data collected from July–August 2020 is used to understand the process of implementation of the technology both in person and remotely and to gain further insight into the potential pathways of results found in the quantitative analysis.

2.1. Quantitative data sources and analysis

The quantitative analysis in this report relies on two sources of data.

The first source of quantitative data is an administrative NFE database that includes children's academic and demographic information collected through the Child Level Monitoring (CLM) platform. The CLM platform is a tool to monitor the education progress of every child enrolled in UNICEF Lebanon-supported NFE programmes.

The CLM designed and managed by UNICEF Lebanon is also a monitoring tool to inform referrals to cross-sectoral support and services. The database includes basic demographic information on NFE participants as well as results from regular learning assessments that are collected at the beginning and end of each round of the respective NFE programme (including but not limited to CB-ECE and BLN). For both CB-ECE and BLN students, the majority (more than 97 per cent) are Syrian, and 51 per cent of the sample are boys. These basic demographic characteristics do not differ between centres that adopted or didn't adopt the digital course during 2020 (see Annex A)³. There are 10,711 children in the dataset who attended CB-ECE classes remotely, with 4,745 children studying at 26 learning centres that reported using the digital course in their remote learning programme. For BLN, there are 4,354 students in the database, and 2,492 children study at 38 learning centres that reported using the digital course during this NFE round.

Learning assessments are collected across seven domains for CB-ECE (Arabic, foreign language (French or English), maths, art, social-emotional, psychomotor, and science) and four domains for BLN (Arabic, foreign language (French or English), maths, and social-emotional). Scores on the assessments are on a 0-100 scale. To understand the effectiveness of remote learning during 2020, the learning assessments collected at the start and end of the NFE round that took place from August–November 2020 are used.

The second source is a short survey sent to education staff from NFE centres around the country to learn about the transition to remote learning. This survey encompassed NFE centres that are UNICEF partners as well as centres that are not affiliated with UNICEF. In total, 72 learning centres from 10 organizations responded to the survey in June 2021.

2.2. Qualitative data collection

The study also draws from qualitative data collection and classroom observations in the three NFE learning centres where the use of the digital course was piloted (see Annex Table B.1).

Between 23 July and 10 August 2020, in-depth interviews were carried out with the head of each of the three initial partner organizations, education coordinators who manage the learning centres where the digital course was introduced, and the Akelius software designers and programme managers. Focus group discussions were conducted with teachers and students.

Due to COVID-19 restrictions, qualitative data collection was partly done remotely (via Zoom or Skype). A few online classroom observations were carried out during the closure of the learning centres. Resulting

³ Except for the differences in the type of caregiver (either the mother or the father), no significant difference was found in terms of children's demographics according to whether their learning centres used the Akelius Digital Language Course.

observational data on the use of the digital course as a remote learning tool were used for validation and triangulation purposes. In total, 34 individuals were interviewed.

Data collection, storage and management were in line with the UNICEF Procedure on Ethical Standards in Research, Evaluation and Data Collection and Analysis. Research instruments and fieldwork protocols were approved by the Health Media Lab (HML) and the Institutional Review Board of the Office for Human Research Protections in the US Department of Health and Human Services Research. To code, organize and analyse qualitative evidence the research team employed thematic content analysis.



3. Findings

3.1. Pre COVID-19: In-class use of the digital course and perceived effects

Teachers introduced the course in different ways to fit it into their practice. While students in each learning centre had individual tablets to use the course, in one of the selected learning centres, teachers routinely displayed the digital course on a projector, allowing learners to make connections between the content they encountered in the course and the lesson all at once. Some teachers used time for students engaging in the digital course on tablets for reviewing key concepts at the end of the class, while others used it as a core teaching method, as they found that it increased learners' engagement, reducing the risk of dropout.

Education coordinators confirmed that the digital course was a flexible tool that teachers used in various ways to achieve learning goals, depending on their lesson plans and the themes they wanted to introduce. However, the importance of consistent teacher-learner interaction supporting what was learnt on the digital course was seen as equally crucial.

"Students may memorize words from a game but this doesn't mean that they can write them down. Worksheets for practice and support from the teacher are essential to solidify newly acquired knowledge."

– Education Coordinator

Teachers saw improvements in classroom management. Participants from each of the three learning centres commented on the positive impact of the digital course on the classroom environment. Teachers mentioned that students appeared happier, as the digital course gave them the opportunity to explore letters, words, and numbers in an interactive manner, using games, images, and multimedia. This made language and related concepts more meaningful and turned the learning process into a fun experience. The digital course was largely perceived as encouraging active learning where students are involved in the learning process and not passively listening to a lecture. Educators further explained that the increased difficulty levels for games, and the instant feedback and scoring that the course provides, were particularly useful in keeping students disciplined, motivated, and engaged.

The digital course encouraged self-paced learning and the individualized monitoring of students' progress. Interviewed teachers and education coordinators indicated that students, especially those at lower learning levels, benefited from the personalized and self-paced use of the digital course. Learners could decide for themselves how fast they moved through the content and whether they repeated activities.

This self-paced learning is difficult to achieve in group instruction and teachers suggested it increased students' autonomy and engagement in the learning process, facilitating their learning.

"[I use it for] everything related to new words, sentences, how to introduce yourself, your family, how to express yourself, and your feelings. It helped the children a lot, especially on everything related to oral communication."

– Teacher

"There is excitement, competition. It changes the mood of the class; the learning process itself in class has improved. The scoring function creates a competitive learning environment among students that pushes the overall performance of the class."

– Education Coordinator

“By allowing children to see their own progress, [the digital course] helps them realize that they are achieving something they could not do yesterday.”

– Teacher

The self-paced nature of the digital course made students feel equal and more confident, which teachers mentioned was especially beneficial for children with disabilities and learning difficulties. Respondents also explained that the digital course helped teachers monitor the progress of their students individually. Teachers could see the progress of each learner to get a sense of how much they had grasped of a concept, to determine whether they were falling behind, and to provide individualized support when necessary.

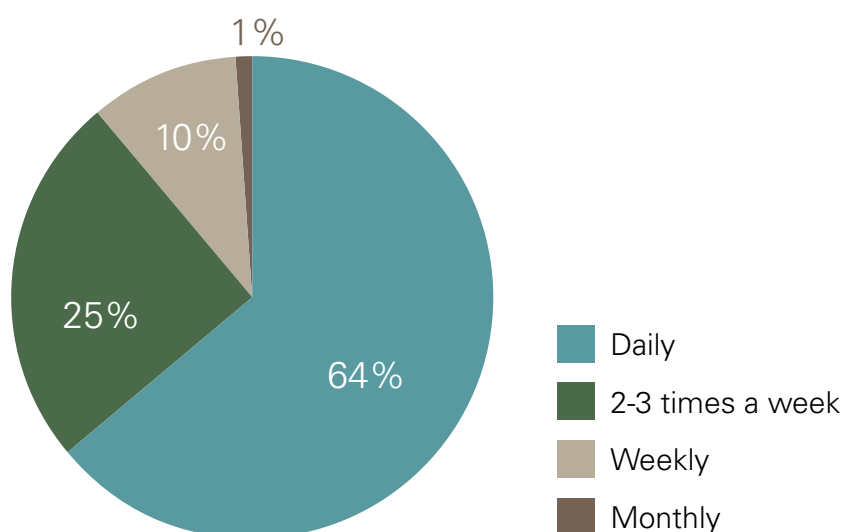
Teachers perceived that the digital course increased students’ speaking skills and confidence. Teachers observed that the in-class use of the digital course improved students’ communication skills, especially their capacity to speak clearly and confidently. Learners confirmed that

the repetition of words and linguistic exercises made them more confident and less self-conscious when speaking a new language. Interview data further suggest that the use of the digital course helped students identify their strengths and weaknesses individually and to correct their own mistakes. For many educators, this was especially evident with younger students in the CB-ECE programme, who appeared more hesitant to speak and to make mistakes during class.

3.2 Transition to digital remote learning

In response to the COVID-19 pandemic, in March 2020 all schools and NFE partners closed in-person classes. This prompted NFE partners to quickly prepare for remote learning. Qualitative data collection from three initial NFE partners that implemented the digital course and a survey of 72 NFE learning centres covering responses from 10 separate implementing partners illustrate that the transition period to remote learning followed multiple steps.

Figure 1: Frequency of contact with parents



Source: NFE Short Survey (June 2021)

3.2.1. Reaching out to families and starting regular communication

Qualitative evidence from each of the three organizations showed the importance of staying in close communication with learners and their families. One education partner began connecting with parents on a weekly basis starting with psychosocial support activities. Another partner began by having teachers contact

all previously enrolled children on WhatsApp, teachers then created WhatsApp groups for students by learning levels.

From the survey of 72 NFE learning centres, 64 per cent reported that they had kept in touch with caregivers daily throughout the period of centre closures, around a quarter were in contact two or three times a week, and a 10th were in contact once a week (see Figure 1). Keeping a strong relationship with the refugee community was extremely important, as NFE partners noted that distrust of institutions made refugee families initially skeptical of remote learning programmes.

3.2.2. Development of remote lesson plans while curating digital content

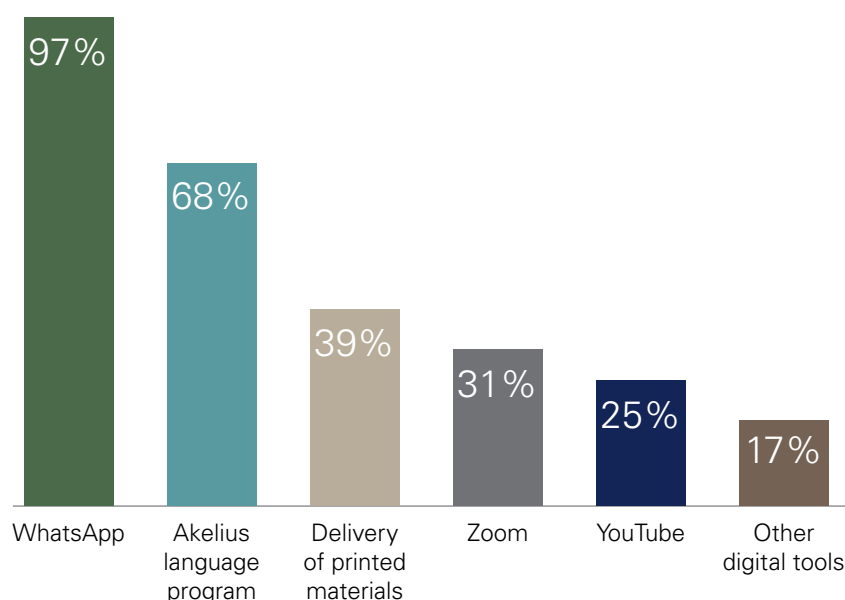
Planning for remote lessons and curating content was the second key step in the transition. One partner explained that they split their teachers into groups. Each group was assigned a specific learning goal and was tasked with creating and curating video content aligned with those goals. Initially, the goals were focused on awareness around health and safety during COVID-19. Gradually, topics shifted towards learning goals aligned with the NFE curriculum.

Figure 2 shows the modalities of communication and the types of content used for remote learning by NFE partners as of August 2020. WhatsApp was used as a method of communication by almost all learning centres (97 per cent). The digital course was used at 68 per cent of centres reporting, and 39 per cent of learning centres reported delivery of printed materials to students.

“We started with an awareness session and built close relationships with the community. The parents were very receptive and it was a good time they spent with us.”

– NFE education coordinator

Figure 2. Modalities of communication and content used for remote learning



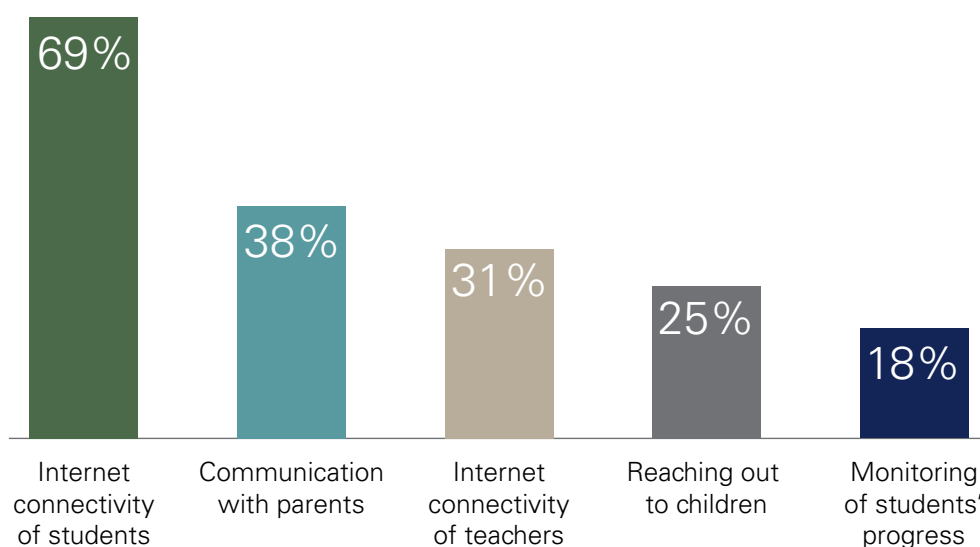
Source: NFE Short Survey (June 2021)

3.2.3. Delivery of devices, connectivity, and guidance on using digital devices and platforms

A major challenge revealed from both the qualitative interviews and the broader survey of NFE centres was unstable electricity and connectivity for refugee families. Around 69 per cent of surveyed centres listed internet connectivity of students as a major challenge in remote learning (see Figure 3). Similarly, 31 per cent of learning centres reported that teachers faced internet access issues as they taught. While educators were curating content in the transition to remote learning, they were at the same time working in communities to help address these technical barriers to accessing remote learning for their students.

The education partners reported providing internet Wi-Fi hotspots, subsidized internet cards and internet top-ups to their students. As access to the necessary technology does not ensure take-up, educators stressed the importance of regular support to families to effectively use technology. An education coordinator from one partner stated that even though some students had previously used the digital course in class, in this new context of remote learning education staff acted as if everyone was new to the programme. In some cases, teachers set up a step-by-step video on how to download, sign into the course and use it online and offline. In other cases, field officers visited communities and helped parents and children with technology, from downloading the application to installing internet routers and updating content using the 'Mesh Net' function. The 'Mesh Net' function, created by the developers, allows one device (tablet or mobile phone) to act as a server to transfer content updates to other nearby devices without internet connection.

Figure 3: Challenges faced by learning centres during transition to remote learning



Source: NFE Short Survey (June 2021)

3.2.4. Remote teaching using WhatsApp and Zoom as communication platforms

Remote classes were commonly conducted using Zoom and/or WhatsApp groups. The choice of using Zoom, WhatsApp, or a combination of the two depended on a number of factors. In general, caregivers were more familiar with WhatsApp and more willing to let their children use it. Some parents were hesitant to allow their children, especially girls, to use Zoom with the video camera on. In areas where internet connectivity wasn't stable enough to conduct classes over Zoom, NFE partners would set up WhatsApp groups of three students to deliver lessons, however this was extremely time consuming for teachers to organize and carry out. Across each of the partners, WhatsApp was the

"The teacher sends us links to videos; we open them and send coursework back. We also watch videos on YouTube. We regularly use YouTube, Akelius, Zoom."

– BLN Student

tool most commonly used for coordination, sending links to videos and other resources, scheduling classes in group chats and receiving feedback individually on work completed by students.

Experiences in implementing remote teaching and learning varied across learning centres and the challenges faced in different implementation settings. Box 2 summarizes various experiences of different remote classes, based on observations of virtual classes and interviews with education coordinators (conducted in July 2020)

As noted in Box 2, there are clear variations in remote teaching based on the characteristics of learning centres, educators, communities, and students. There is also suggestive evidence that there were systematic differences in the implementation of remote learning modalities and tools between centres that chose to use the digital course and those that did not. Figure 4 illustrates these variations.

Box 2. The use of the digital course in three different remote classrooms

Class 1: Practicing using the digital course in the remote classroom and reviewing progress after each step.

The teacher started the virtual class conducted over Zoom by checking attendance and making sure that all students had access to the digital course. He then asked students to go to Level 8 and to enter their username and password.

As they started, the teacher informed students that they should send a picture on the WhatsApp group of their progress as they completed each step.

While the teacher viewed the photos, he provided feedback. If any delay or mistakes were noticed, he addressed individual students separately and muted all others in order to provide tailored feedback on how to complete the exercises.

Source: Observational data collected (July 2020).

Class 2: Using the digital course as homework following a remote class.

As a follow-up to the remote learning class, the teacher asked students to practice writing sentences in their workbooks and to send pictures of their work using WhatsApp.

The teacher also encouraged students to practice using the digital course on their or their caregivers' phones.

The digital course was not used in class. Instead, the teacher guided students to complete a certain level in the course to practice the topic and the technique she had taught during class.

After finishing the session, students shared screenshots of their work on the digital course on the WhatsApp group.

Source: Observational data collected (July 2020).

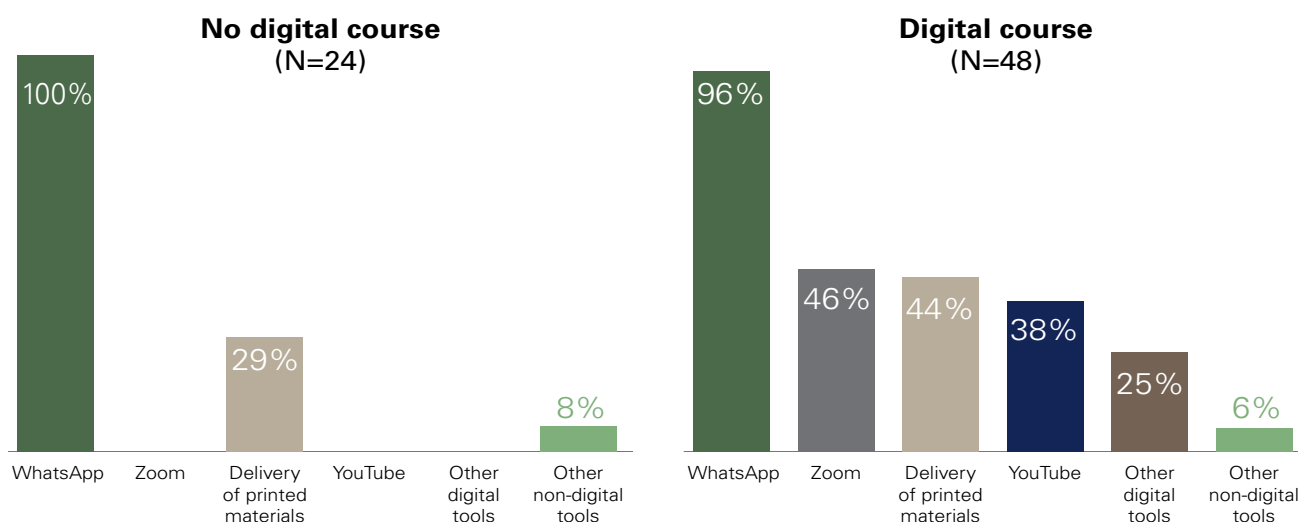
Class 3: Ad-hoc use of the digital course leaving it up to the families.

The centre coordinator stated that after seven weeks of experience with remote learning, teachers still needed a better plan to implement the digital course within their remote classes.

Parents in that community were having trouble adapting to remote learning. As a result, the team was more focused on staying in regular contact with families via WhatsApp, leaving the use of the digital course up to the parents and the students.

Source: EC Interview (July 2020).

Figure 4: Communication modalities and digital content used in remote learning, by digital course adoption

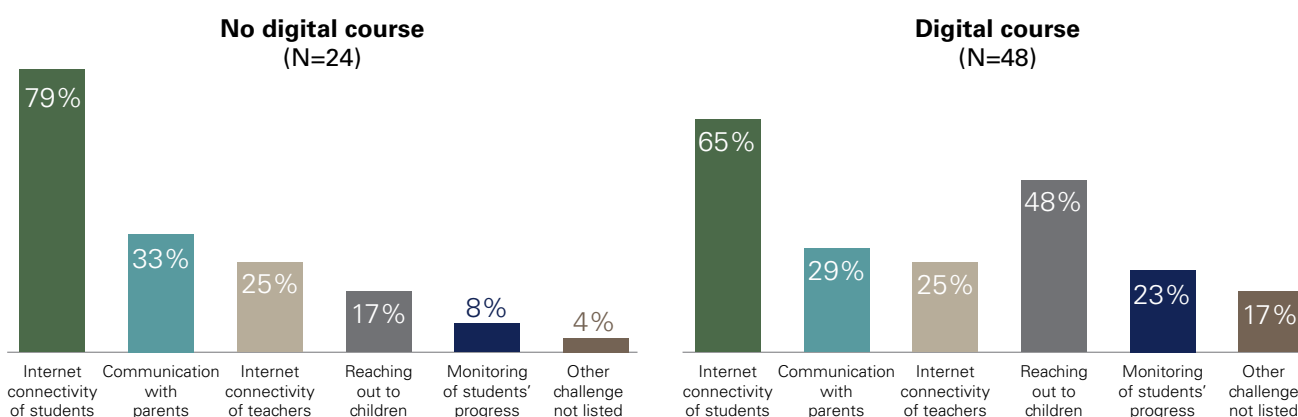


Source: NFE Short Survey (June 2021)

Centres that adopted the digital course as part of their remote learning curriculum were more likely to report using any type of digital tool/content in the survey of NFE centres conducted in June 2021. In particular, centres that adopted the digital course were far more likely to use Zoom (46 per cent vs 0 per cent) and to share content with students, such as YouTube videos (38 per cent vs 0 per cent). This provides a strong indication that centres that opted to use the digital course were already better able to transition to remote learning, based either on their capacity, community access to digital devices and connectivity, or likely a combination of the two.

Learning centres that did not adopt the digital course reported higher rates of internet-related challenges, both for teachers and students (see Figure 5). While 79 per cent of learning centres that did not adopt the digital course reported internet connectivity as a challenge for remote learning, 65 per cent of learning centres that did adopt the digital course reported the same issue.

Figure 5: Challenges faced by learning centres during remote transition, by digital course adoption



Source: NFE Short Survey (June 2021)

A higher proportion of centres that adopted the digital course reported communication with parents as a challenge. While more investigation is needed, one hypothesis is that areas with the digital course had higher connectivity. Thus challenges that occur during the use of digital learning including engagement with parents become more salient than in areas where connectivity is a hard barrier.

3.3 Effectiveness of Digital Remote Learning

This section investigates children's learning outcomes in the first semester or round of remote NFE classes from August–November 2020. The analysis first explores how children learned overall during remote learning in the CB-ECE and BLN programmes. Second, the analysis investigates the outcomes of students in centres that adopted the digital course within their remote learning programmes and those that didn't.

Descriptive analysis of learning outcomes from each of the NFE partners outlined in the following section shows that the centres adopting the digital course had higher baseline learning assessment scores across domains. Therefore, a number of controls are used in the econometric analysis in the following section to reduce the risk of omitted variable bias.

3.3.1. Overall learning gains during remote classes

Students attending both CB-ECE and BLN classes remotely improved learning outcomes across all domains measured in the CLM database (seven domains for CB-ECE and four domains for BLN)⁴.

Table 1 presents a summary of learning assessment scores at the beginning and at the end of the semester for students in the CB-ECE and BLN classes. For the foreign language (French or English) competency of CB-ECE, students improved scores by an average of 43 points (73–30). A similar increase of 34 points (58–24) is observed in the same competency for older BLN children.

Table 1: Competency scores before and after the first semester of remote learning for CB-ECE and BLN (out of a scale of 100 points)

	N	Foreign language		Arabic		Maths		Art		Social emotional		Psycho-motor		Science	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
CB-ECE	10,711	30	73	35	78	32	79	45	86	41	81	48	85	36	83
BLN	4,353	24	58	37	68	35	69	-		52	77	-		-	

Source: Child Level Monitoring (CLM) database

4 See Annex C for assessment tools and competencies assessed at learning centres.

3.3.2. Use and effectiveness of the digital course in remote learning

Among the seven domains of learning recorded through the CLM database for CB-ECE students, analysis on the influence of the digital course on learning focuses on foreign language, Arabic, maths and art (see Table 2).

Table 2: Competency scores before and after the first semester of remote learning for CB-ECE, by digital course (100 point max.)

	N	Foreign language		Arabic		Maths		Art	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post
No digital course	5,966	19	59	29	68	25	72	36	78
Digital course	4,745	43	91	43	91	41	89	56	96
Across	10,711	30	73	35	78	32	79	45	86

Source: Child Level Monitoring (CLM) database

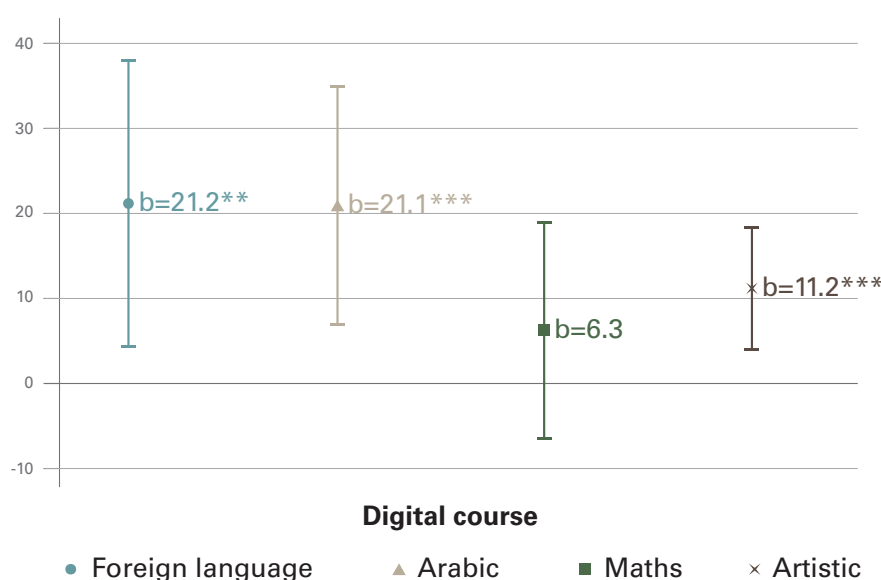
The choice to focus on these competencies is based on the content and features of the digital course, which teaches foreign languages (English or French) and has a heavy focus on songs and games to enrich interactive learning. Although the digital course does not have Arabic content, studies such as [Kaushanskaya et al., \(2011\)](#) show associations (both positive and negative) between first and second language acquisition, suggesting that second language experiences influence first language learning. Therefore, the analysis considers the potential correlation between second language acquisition and native language learning.

Children studying at the learning centres that adopted the digital course performed better across all competencies at the time of the baseline learning assessment in August 2020 than children in the learning centres that didn't adopt the digital course. In terms of foreign language, children attending remote classes run by centres that used the digital course scored 42.5 points at the beginning of the semester, while children in centres where the digital language course wasn't used scored just 19.3 points. Given these initial differences in competencies, and the self-selection of centres to use the digital course, the analysis is careful in the examination of the effectiveness of the digital course, ensuring that the baseline differences in competencies scores are controlled for.

The analysis finds that students taking the digital language course performed better on learning assessments in foreign language, Arabic, and art than their peers who didn't do the digital language course. These results are statistically significant and control for students' individual characteristics; the way the assessment was conducted; students' baseline learning levels determined through a pre-test, and geographical differences in the learning centres (see Box 3 for a complete explanation of the empirical procedure).

Figure 6 shows the estimated difference in scores for CB-ECE students in centres that adopted the digital course compared to those that didn't, on each of the four learning competencies of interest after controlling for pre-semester learning levels, demographic characteristics and the location of implementation. Children in centres that used the digital course as part of their remote learning programme show a statistically significant improvement in foreign language, Arabic, and artistic scores. The foreign language scores of children exposed to the digital course is 21 points higher (0.7 SD) than children studying at the learning centres that didn't introduce the digital course. Similarly, Arabic and art competencies increased by 21 points (0.9 SD) and 11.2 points (0.5 SD), respectively⁵. Further analysis shows that there is no significant difference in effect by gender (see Annex Table D.2).

Figure 6: Estimated improvements in learning competencies associated with digital course use for CB-ECE children



Source: Child Level Monitoring (CLM) database

Notes: "b" in the figure represents beta coefficient.

The asterisk shows the statistical significance of the coefficient: * $p < .10$, ** $p < .05$, and *** $p < .01$

5 To consider the non-linear effect of the digital course on competencies, scores standardized to standard deviation are also presented (see Annex Table D.1).

Box 3. Empirical estimation strategy and robustness checks

To estimate the association between the use of the digital course during remote learning and learning outcomes of students, the empirical analysis was conducted using the following equation:

$$Post\ assessment_{ci} = \alpha + \beta_1 Digital\ Course_c + \delta Pre\ assessment_{ci} + X_{ci} + \gamma_c + \rho_c + \epsilon_{ci}$$

The primary variable of interest is the post-semester assessment score (*Post assessment_{ci}*) and the difference (β_1) between those attending classes with the digital course and those without.

To isolate the association with the use of the digital course we control for a number of centre-level (c) or individual-level (i) characteristics. X_{ci} is a vector of students' individual characteristics: gender, age, disability status and exposure to psychosocial support programmes. These characteristics are included to control for factors that may influence differences in children's learning levels. Equally important, δ *Pre assessment_{ci}* controls for individual students' pre-semester learning levels using pre-test scores taken in August 2020. As the decision to take up the digital course was up to each learning centre, it is likely that unobserved characteristics are correlated with both the choice to use the digital course and the children's learning outcomes. Based on the assumption that those unobserved characteristics would affect the pre-semester and the post-semester scores in a similar way, the analysis uses the baseline score as a control to reduce the risk of omitted variable bias. In this sense, the results presented in this section focus on performance improvement over the semester. Finally, the estimation controls for geographical differences by including learning centre fixed effects (γ_c) and the way in which the assessment was conducted, as this varied based on the situation of the pandemic in each locality (e.g., online assessment, assessment over the phone, in-person visit) (ρ_c)¹. The standard errors (ϵ_{ci}) are clustered at the learning centre-level as the exact implementation of remote learning is determined by learning centres.

To check the robustness of the results, the analysis on maths is presented as a false outcome test. This is a 'false outcome test' as the research doesn't expect a significant association with maths results from use of the digital course. Although the recent version of the digital course offers some maths content, this content is far less developed and teachers during the period of analysis reported not having used maths content in their classes. Therefore, results showing a non-significant effect for maths scores support the hypothesis that the main findings on languages or art aren't driven by external factors other than the use of the digital course. The same estimation was conducted on other competencies that have fewer tangible links to the content of the digital course namely social-emotional, psychomotor, and science (see Annex Table D.3). The expectation is that, since these outcomes should not be directly tied to the content and features of the course, one would expect a more muted association between the use of the course and these outcomes. Results from these additional false outcomes checks are similarly non-significant.

¹ Note that no significant differences between scores are observed based on how the assessment was conducted (online, over the phone, or in person).

For BLN students, competencies on foreign language, Arabic, maths, and social-emotional development are collected and stored in the CLM database. Running the same model, improvements in foreign language scores were observed but the results were not statistically significant (see Annex Table D.4). This different result from the CB-ECE findings may highlight that CB-ECE children more quickly gain language skills as early exposure to a second language is related to higher proficiency of the language (Krashen et al., 1979; Singleton, D., 2001). It is also important to note that the sample size used for the CB-ECE analysis is twice that of the BLN.

"The nice thing is that it [the digital course] includes many pictures and photos. You can give me a new word for a month but I will never learn it without a picture. If a picture is attached to the object, I can remember the word for it."

– Student

Qualitative evidence corroborates quantitative findings, with teachers reporting perceived increases in language learning outcomes across both BLN and CB-ECE programmes. Educators noted that listening was the language skill most improved in remote learning. When working on the digital course, learners could listen to specific words and phrases multiple times at their own pace. This seems to have improved word recognition and English and French pronunciation. Students were happy that they could log in to the course independently and felt that the visual cues embedded in the application were enhancing their learning experiences, facilitating their understanding of objects (e.g., the tomato) and their capacity to read and write short words and sentences.

"I log in alone on the digital course, without anyone helping me. I learn a lot."

– Student

3.4. Effects beyond students' learning

In both the survey of NFE centres as well as qualitative interviews education coordinators mentioned externalities (or spillover effects) from remote learning. In certain areas education coordinators reported that attendance at remote classes was higher than for in-person classes, noting that students that live in harder-to-reach areas, or older students who work, were more able to attend. However, the challenges to engage with children and families from a distance and the connectivity issues across Lebanon should not be underestimated (as examined in section 3.2). Education coordinators also reported that in many cases parents took part in classes with their children and learned from the digital course. As closures made constant and continuous engagement between learning centres and parents a necessity, educators observed that this led to their increased engagement in their child's education. However, they also explained that there is no substitute for in-person learning, and the type of care, feedback, and interaction that teachers provide to students and that students have with their peers in the classroom.



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4. Conclusions and recommendations

The closure of in-person classes around the world as a response to COVID-19 has shown the lack of preparedness of education systems to continue children's learning from a distance. Developing digital learning systems and practices that can be leaned upon and used in times of crisis could also enrich education practices in times of normality. However, for digital learning systems to be effective they must be inclusive, providing opportunities to accelerate children's learning, rather than entrenching existing inequities ([Brossard et al., 2021](#)). Those who stand to benefit the most from digital learning are also those with the least access to the tools and support needed for digital learning to succeed.

In the case of Lebanon, Syrian refugees face challenges related to poverty, discrimination, and lack of connectivity, all of which reduce their ability to succeed in education be that in-person or remote. As digital learning programmes and systems proliferate, there is an urgent need for the education community to test and learn from digital learning delivered in challenging circumstances, rather than piloting them in rich contexts with favorable connectivity and technology conditions. As noted in [Unwin et al., 2020](#): "As a starting point, to deliver equity in the use of digital technologies in education means beginning where it is most difficult." The experience of the UNICEF-Akelius Foundation in Lebanon is one such example, implementing digital learning for those who could stand most to benefit under very challenging circumstances. This research from Lebanon adds to the growing base of knowledge showing that digital technologies can enhance marginalized children's learning when technological barriers are overcome and the technology is implemented in a clear pedagogical approach supporting teachers and their practice.

When the digital course was used during in-person classes, qualitative evidence from teachers indicates that the use of the course led to improvements in their classroom environment, student's confidence, motivation to go to class, and speaking skills. When implemented in a fully remote learning environment, students from early childhood education classes that implemented the digital course showed statistically significant improvements in foreign language (French or English, 21.2 per cent increase), Arabic (21.1 per cent increase), and art (11.1 per cent increase) competencies compared to students from centres that didn't use the digital course, when controlling for pre-semester learning levels, location of implementation, and demographic characteristics.

Teachers remained the key to successful implementation of digital learning when centres closed, providing extra-academic support to students and families. The role of teachers grew when classrooms closed, they provided psychosocial support to families, as well as technological support, from developing and delivering guides on the use of technology, to providing data package top-ups and even helping install internet routers within communities. In 2021, NFE education centres in Lebanon began to transition from full remote learning to a hybrid approach, with classes alternating between being delivered in-person and remotely to adhere to social distancing. Teachers are building on the lessons learned throughout the pandemic to better use digital tools in their classrooms, whether these classrooms are in-person or virtual. Key recommendations from this research relevant to governments, international organizations, and education practitioners seeking to build equity-based digital learning programmes to build resilience into education systems, are summarized next.

Recommendations for policymakers, education practitioners, and EdTech developers:

- **Governments should prioritize investments in reliable electricity, and connectivity infrastructure, especially for hard-to-reach and marginalized areas and populations.**

At the same time, work must be accelerated with the private sector to ensure low-cost and affordable data, all of which are needed to enable equitable digital learning. Education partners across Lebanon cited connectivity as the major barrier faced when providing digital remote learning, compounded by the high cost of data.

- **Frequent communication with families and communities should continue beyond remote learning to sustain increased caregiver engagement in their children's learning.** Education coordinators noted that caregivers were more engaged in their children's learning while using the digital course at home. For refugee families with low trust of institutions, the trust and relationships built with community-based NFE actors continues to be critical to encourage families to pursue education for their children.

- **Education providers must invest in the digital skills of teachers and facilitators and their readiness for digital learning, whether in the remote or physical classroom.** Implementation of digital learning during school closures varied between centres, partners, and teachers. Many times differences were based on the capacities of teachers and various technological constraints in communities. Investments in the digital skills of teachers and facilitators need to be met with ongoing support and guidance for teachers and facilitators on how to effectively integrate technology into their teaching practice.

- **The support system needed to enable digital learning must be invested in, and the key role of teachers in successful implementation of EdTech must be acknowledged and supported.** Teachers provided extra academic support to families in alleviating technology and connectivity issues throughout school closures. The use of technology for learning requires much more than a device held by a student and an engaged teacher. Governments and education providers should cost and invest in the entire support system for digital learning including in human resources to alleviate technological and connectivity challenges, to monitoring and evaluation systems, and implementation research to understand how digital learning works. Doing this would reduce the burden that falls on individual teachers or organizations to provide technology support on top of their regular teaching duties.

- **Software developers should design programs and prioritize application features that align with the needs of teachers and to the constraints of the learning environment.** While interactive and engaging content should be a priority, it must be coupled with EdTech solutions designed to be used in low- or no-connectivity settings. Development of digital learning technologies that allow for interactive learning offline are critical to address the needs of the majority of children living in areas with no or intermittent internet connectivity.

Annexes

Annex A – Demographic characteristics of children by the digital course use

CB-ECE

	Across	No digital course	Digital course	Min	Max
Digital learning	0.44	0	1	0	1
Individual information					
Age	5.54	5.31	5.82	4	6
Male	0.52	0.52	0.52	0	1
Nationality: Syrian	0.97	0.99	0.95	0	1
Disability	0.04	0.03	0.06	0	1
Caregivers					
Mother	0.17	0.25	0.06	0	1
Father	0.83	0.74	0.94	0	1
Other	0.01	0.01	0	0	1
Observations	10,711	5,966	4,745	10,711	10,711

Notes: The table provides the descriptive statistics of child demographic information

BLN

	Across	No digital course	Digital course	Min	Max
Digital learning	0.57	0	1	0	1
Individual information					
Age	11.83	11.90	11.78	10	14
Male	0.51	0.47	0.54	0	1
Work	0.15	0.09	0.20	0	1
Disability	0.05	0.03	0.07	0	1
Caregivers					
Mother	0.40	0.38	0.42	0	1
Father	0.59	0.61	0.57	0	1
Other	0.01	0.01	0.01	0	1
Observations	4,354	1,862	2,492	4,354	4,354

Notes: The table provides the descriptive statistics of child demographic information

Annex B – Sampling for qualitative data collection

Table B.1: Selected learning centres for qualitative data collection

Learning centre / Implementing partner	Location	Age of interviewd recipient	Version of digital course
Mouvement Social	Ghobeiry	10 - 14	English
LOST	Bekaa	10 - 14	English and French
Ana Agra	Mount Lebanon	5 - 8	English and French

Annex C – Example of assessment tools for language and art development (CB-ECE)

Child Progress Follow Up

CB-ECE

Level 3

All the below criteria are related to the learning objectives of the curriculum of ECE. The ratings reflect the developmental level of the child in each domain at the time of assessment.

Casa: _____

Centre: _____

Name of child or code: _____

Name of facilitator: _____

Date of the observation: _____

Ratings:

- **N (Not observed):** Child does not demonstrate skill or behaviour at this time
- **P (In Progress):** Child demonstrates skill or behaviour with some support
- **O (Observed):** Child can demonstrate skill or behaviour independently

Note: During remote learning, this adapted assessment tool is used according to the colour coding below, and as soon as the direct implementation is back in centres – even if partially – then the original assessment tool is to be used.

Language Development

Evaluation	Pre		Post		
	N (0)	P (1)	N (0)	P (1)	O (2)
Oral Language (Listening / Speaking)					
1 Follows three-step instructions					
2 Understands "What, Where, Who" questions					
3 Understands action verbs (stop, go, start, etc.)					
4 Speaks clearly and articulates words					
5 Identifies some letter sounds					
6 Retells information from a story					
7 Listens attentively and respond to stories read aloud					
8 Makes connections to own experience when listening to stories					
9 Speaks simple words and phrases to express needs, wants and feelings					
10 Uses new words learned in the unit					
11 Repeats rhymes and participates in singing songs					
12 Formulates more complex sentences of more than five words					
13 Tells own stories comprehensibly					
14 Uses comprehensibly high-frequency words (days of the week, etc.)					
15 Asks simple questions					
Written Language (Reading/Writing)					
16 Recognizes letters (lower case and upper case)					
17 Recognizes first name in print					
18 Recognizes own name and that of peers in the environment					
19 Shows interest in reading stories independently					
20 Reads high-frequency words					
21 Reads simple sentences of two to three words					
22 Uses scribbles, symbols, or drawings to express ideas					
23 Writes own name					
24 Writes some letters or words legibly					
25 Chooses to write as play, or in informal situations, for example, filling in forms, writing a menu or wish list for a party					
26 Differentiates between illustrations and written text					
Visual Language (Viewing / Presenting)					
27 Describes what is seen in a picture					
28 Recognizes symbols and logos in the environment					
29 Recognizes connections between pictures					
30 Sequences pictures to tell a story					
Subtotal for each rating					
Grand adapted total/60					

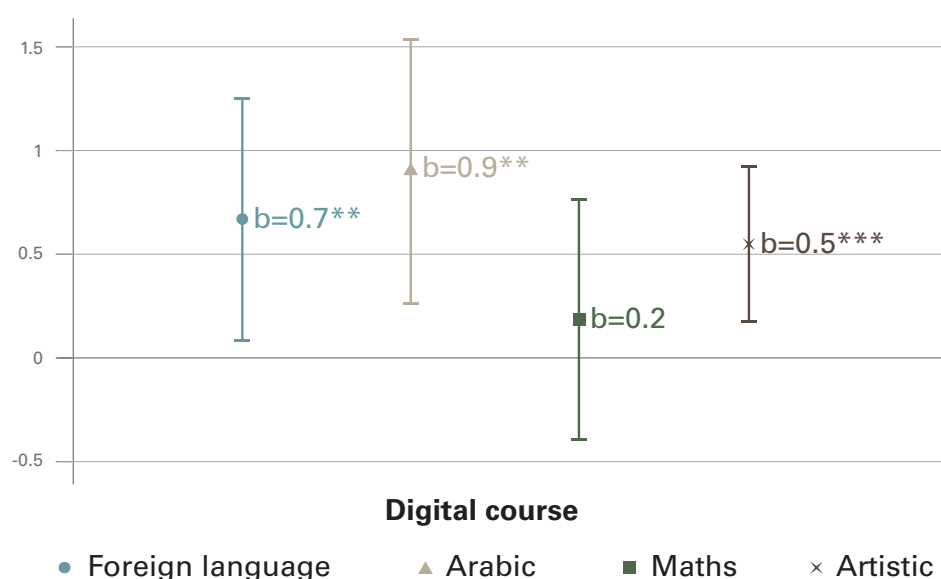
Comments:

Artistic Development

Evaluation	Pre		Post		
	N (0)	P (1)	N (0)	P (1)	O (2)
1 Enjoys drawing and painting using available materials					
2 Adds details in artistic drawings					
3 Uses body, voice, and imagination to create characters					
4 Repeats simple patterns of rhythm and music					
5 Uses voice expressively					
6 Utilizes voice and body as a mean of artistic expression					
Subtotal for each rating					
Grand adapted total/12					

Annex D – Robustness checks for empirical analysis and additional analyses

Figure D.1: The association of the digital course on the main outcomes standardized to SD

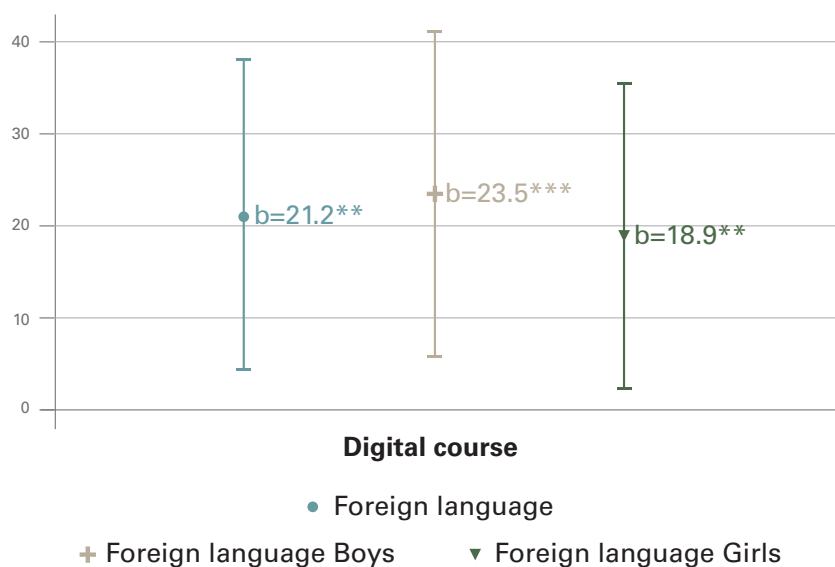


Source: Child Level Monitoring (CLM) database

Notes: "b" in the figure represents beta coefficient.

The asterisk shows the statistical significance of the coefficient: * $p < .10$, ** $p < .05$, and *** $p < .01$

Figure D.2: The effect of the digital course on foreign language for CB-ECE children by gender

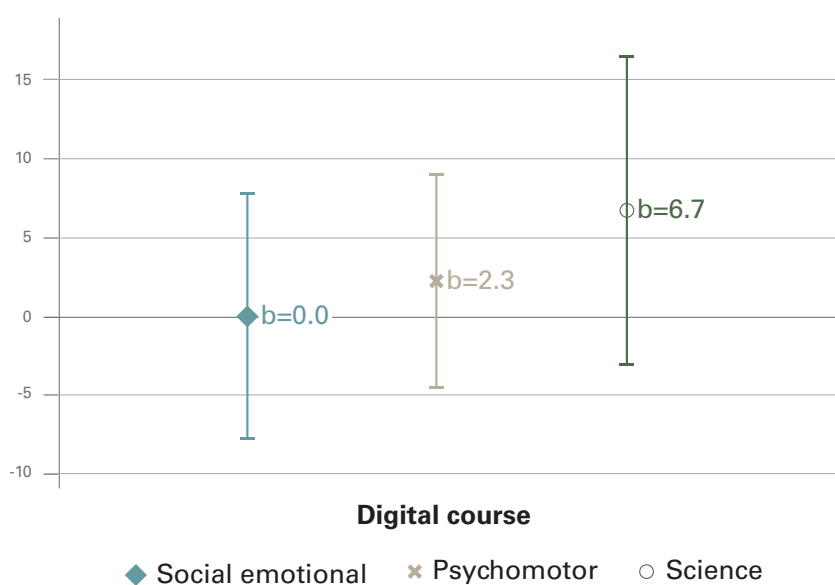


Source: Child Level Monitoring (CLM) database

Notes: "b" in the figure represents beta coefficient.

The asterisk shows the statistical significance of the coefficient: * $p < .10$, ** $p < .05$, and *** $p < .01$

Figure D.3: The association of the digital course on the outcomes that do not expect the effects



Source: Child Level Monitoring (CLM) database

Notes: "b" in the figure represents beta coefficient.

The asterisk shows the statistical significance of the coefficient: * $p < .10$, ** $p < .05$, and *** $p < .01$

for every child, answers

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